Designation: F 1686 – 97

Standard Guide for Surveys to Document and Assess Oiling Conditions on Shorelines[1]

This standard is issued under the fixed designation F 1686; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers field procedures by which data may be collected in a systematic manner to document and assess the oiling conditions on shorelines.

1.2 This guide does not address the terminology that is used to define and describe shoreline oiling conditions, the ecological character of oiled shorelines, or the cultural or other resources that may be present.

1.3 The guide is applicable to marine coasts (including estuaries) and may also be used in freshwater environments (rivers and lakes).

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

F 1687 Guide for Terminology and Indices for Describing the Oiling Conditions of Shorelines[2]

F 1779 Practice for Reporting Visual Observations of Oil on Water[2]

3. Significance and Use

3.1 Systematic surveys provide data on shoreline conditions from which informed planning and operational decisions may be developed with respect to shoreline cleanup.

3.2 Surveys may include one or more of three components, listed below. The scale of the affected area and the availability of pre-spill information will influence the selection of survey components and the level of detail **(1)**.[3]

3.3 The aerial reconnaissance survey provides a perspective on the overall extent and general nature of the shoreline oiling conditions. This information is used in conjunction with environmental, resource, and cultural sensitivity data to evaluate which areas require a response and the priorities of the response operations.

3.4 The aerial videotape survey(s) provide systematic audio and video documentation of the extent and type of shoreline oiling conditions, physical shoreline character, and potential access restrictions **(2)**.

3.5 The ground assessment survey(s) provide the necessary information and data to develop appropriate shoreline response recommendations. A field team(s) collects detailed information on shoreline oil conditions, the physical and ecological character of oiled shorelines, and resources or cultural features that may affect or be affected by the timing or implementation of response activities **(2)**.

3.6 In order to ensure data consistency it is important to use standardized terminology and definitions in describing oiling conditions, as provided in Guide F 1687.

4. General Considerations

4.1 The specific survey procedures and the magnitude of the data sets collected will vary with the scale of the spill (the length and distribution of oiled shoreline and quantity of oil), the nature or complexity of the shoreline, and the needs of the response organization **(3)**.[4]

4.2 Following a spill in which only a few kilometers of coast have been oiled, one ground survey team may be able to accomplish all of the goals in an appropriate time frame.

4.3 As the scale of the affected area increases, it may be necessary to conduct an aerial videotape survey that is followed by a ground assessment using one or more teams.

4.4 Following spills that affect long sections of coast (for example, more than 100 km), the sequence of an initial aerial reconnaissance, an aerial videotape survey and ground assessment surveys may be necessary to satisfy planning and operational requirements in a timely manner **(2)**.

4.5 Each of the three stages requires a separate survey

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[2] *Annual Book of ASTM Standards*, Vol 11.04.

[3] The boldface numbers in parentheses refer to the list of references at the end of this standard.

[4] Owens, E. H., and Sergy, G. A., *Field Guide to the Documentation and Description of Oiled Shorelines*, ISBN 0-662-22048-X, Environment Canada, Edmonton, Alta., 1994.

design, the assignment of duties to personnel, logistics planning, and the establishment of survey and documentation procedures.

4.6 All surveys are conducted during the lowest one-quarter to one-third of the tidal cycle to ensure maximum (viewing) exposure of the intertidal zone **(1)**.

5. Segmentation

5.1 The coast is divided into working units called segments, within which the shoreline character is relatively homogeneous in terms of physical features and sediment type.

5.2 Each segment is assigned a unique location identifier (for example, an alpha-numeric code).

5.3 Segment boundaries can be either prominent geological features (headlands, streams, etc.), changes in shore/substrate types, or, more importantly, alongshore changes in oil conditions.

5.4 Segment lengths are short enough to obtain adequate resolution and detail on the distribution of the oil for planning and operational decisions. Most segments of oiled shorelines would be in the range of 0.2 to 2.0 km.

5.5 If segments already exist as part of a pre-spill planning exercise or sensitivity mapping database, segment boundaries may need to be adapted, segments subdivided, or the segment codes revised, or some combination thereof, to reflect the oiling conditions created by a spill.

6. Aerial Reconnaissance Survey(s)

6.1 An initial aerial survey(s) is conducted along coastlines within the spill path. The objective is to determine which shorelines have been oiled, in order to provide an overall perspective and scale with which to plan for a more systematic documentation or assessment survey.

6.2 This survey can be augmented with information from a high-altitude surveillance and tracking program. In some cases this survey can be combined with other aerial reconnaissance activities being conducted to locate and visually observe oil on water (Practice F 1779) **(2)**.

6.3 Fixed-wing or rotary-wing aircraft fly the coast at slow-speed flight at altitudes in the range of 75 to 150 m. Helicopters are preferred over fixed-wing aircraft, as they permit landings to confirm observations made from the air. Among fixed-wing aircraft, those with the wing mounted above the fuselage (high-wing aircraft) are essential to allow the required visibility of shoreline features.

6.4 If possible, the survey team will consist of an oil observer and navigator/recorder. The observer should be an oil-spill specialist familiar with oil on shorelines and able to distinguish between natural materials (stranded kelp, black lichen, heavy mineral bands, etc.) and oil. The navigator logs the flight lines, locates a section of shoreline on maps or charts, and records oil observations.

6.5 Records of observations may be made on maps and notebooks. Videotape and still photography can also be used to add a visual record of examples of the oiling conditions and shoreline character for immediate use by planners and decision makers.

6.6 An aerial reconnaissance is generally not required where the presence of oil on the shore has been defined clearly from other sources or where the affected coastline is short enough in length that an aerial videotape survey can be completed during one low-tide cycle.

7. Aerial Videotape and Mapping Survey(s)

7.1 The aerial videotape recording and mapping survey(s) are conducted on coasts where there is known or expected oiling. The survey is used to provide detailed and systematic documentation on the extent and type of shoreline oiling and other shoreline conditions **(2)**.

7.2 Small high-wing or rotary-wing aircraft fly the coast at very slow speeds at altitudes in the range of 25 to 75 m.

7.3 The primary survey team consists of an oil observer and a navigator. The navigator records and maps relevant flight information. The oil observer operates the video camera and provides a continuous audio commentary, for which the color video image provides a visual image frame of reference. In some cases a video technician may be desirable for the operation and quality control of the audio and video recordings.

7.4 The oil observer/videographer is an oil-spill specialist, who can identify the shoreline substrate and form and distinguish between natural shoreline materials and stranded oil. Duties of the oil observer are as follows:

7.4.1 To identify or create segment boundaries and describe their location on one of the audio channels. These are also recorded on a set of flight-line maps or charts by the navigator.

7.4.2 To videotape the shore zone through an open door or window continuously, with the camera angled down (30 to 45°) and slightly ahead of the aircraft (15 to 30°) so that the area being described comes into focus and the foreground during the commentary. Video resolution is best when the sun is behind the aircraft.

7.4.3 To provide a continuous descriptive commentary on the shoreline oiling conditions, including the (*1*) length and width of the oiled areas and the oil distribution (percent surface oil cover), (*2*) physical shore-zone character, and (*3*) other pertinent features such as access locations or constraints **(4)**.

7.5 Video recording equipment requires either a camera/recorder/color monitor system or a camrecorder system. Both must have on-screen date/time, audio recording, and lowlight recording capabilities. Other requirements include an independent, stabilized power supply or converter and a voice-activated two-channel audio recording and communications system between all crew members, including the pilot. Also desirable is the capability for location (geographical positioning system) overprint on the image, a stabilized camera mount, and small inboard color monitor(s).

8. Ground Assessment Survey(s)

8.1 Shoreline ground assessment surveys are conducted on oiled segments that may have been identified by the aerial reconnaissance or aerial videotape-mapping survey(s), to provide detailed, systematic observations that are used to guide the development of appropriate treatment or cleanup activities **(5)**.

8.2 The scale of the ground survey is dependent on the size and character of the area affected and the intended use of the survey data.

8.3 Where more than one survey team is used, appropriate

measures must be taken to ensure consistency in procedures and terminology.

8.4 Typically, a ground survey team must contain an oilspill shoreline specialist and may include a coastal ecologist, cultural resources specialist, and different agency representatives, depending on available personnel and the complexity of the spill.

8.4.1 In the most simple form, the survey is conducted by an oil-spill shoreline specialist who has a basic understanding of marine coastal geomorphology and processes, oil behavior, and cleanup. Using standardized terms, definitions, and procedures, this person documents the oiling conditions and the physical character of each oiled segment.

8.4.2 A specialist in coastal ecology may be included in the team(s), as necessary, to identify and assess intertidal communities and evaluate the effect of the oil or the potential effect of treatment options. The ecologist may also (*1*) verify the occurrence of sensitive habitats or species (in the segment) that were identified previously in sensitivity maps or databases, (*2*) identify and document human use activities in a segment, and (*3*) identify procedures or constraints on response operations to minimize effects on the biota.

8.4.3 A cultural resources or archaeological specialist may be included on the team(s), as necessary, to identify known or suspected archaeological, historical, or other cultural sites. The specialist may also (*1*) help evaluate potential effects or various treatment options, (*2*) if authorized, collect artifacts for their preservation, and (*3*) identify procedures or constraints on response operations to avoid potential impacts on the sites in or adjacent to oiled segment(s) **(5)**.

8.4.4 Representatives of government agencies, land owners or managers, the potential responsible party, and the operations team may participate as observers to assist in the subsequent development of response options and constraints.

8.5 In its basic form, the survey would document and assess the surface and, where applicable, subsurface oiling conditions. On shores where the materials are mobile or where the oil can permeate into the substrate, it is necessary to dig pits or trenches to locate and describe oil that has been buried or has penetrated. The inclusion of ecological or archaeological observations would depend on the purpose of the survey.

8.6 Standard forms are recommended in order to ensure that all necessary data are recorded or considered in a consistent manner. These are typically designed to suit the spill situation. An example of a generic shoreline oiling summary (SOS) form is provided in Fig. 1. Simpler forms may be used where appropriate to the intended purpose of the spill survey. Similar forms may be adapted for use in freshwater or riverine environments or on a regional basis to be applicable to non-temperate or tropical shore-zone conditions.

8.7 A field sketch (see Fig. 2) is recommended to locate oiled zones within a segment, where the oil is not distributed uniformly, or to identify shore-zone features. A map sketch rather than a perspective drawing is interpreted more easily and can include oiling, substrate character, photographic, and scale information.

8.8 Still-color photographs or videotape recordings can supplement the completed form and sketch. More information can be recorded on the audio channel of a videorecorder than can be recorded in a field note book, by sketches or photographs. The system has the advantage over notes or a tape recorder as a visual image is provided of the location under discussion. This technique is particularly recommended for surveys or segments in which the shoreline or oiling conditions are particularly complex, unusual, or spatially variable.

8.9 There are several post-survey activities that are optional. Prior to departing a survey site, a team may review individual assessments quickly and discuss findings to ensure that nothing significant has been overlooked. At the completion of each day it is typical to review, recopy, and finish, as necessary, all forms, maps, notes, etc. Completed survey documentation should be filed or archived as appropriate. Survey findings may be put on a database and may be used to calculate or assess the degree or relative severity of oiling (see Practice F 1779) and facilitate the setting of cleanup priorities. Reports on findings or recommendations may be submitted to the command center or presented to planners and decision-makers in various forms, as required, to provide them with an accurate perspective on the extent and degree of oiling and to assist them in setting cleanup priorities and in selecting response techniques.

SHORELINE OILING SUMMARY (SOS) FORM - General Temperate Environment Page ___of ___

1. GENERAL INFO	Survey Date (m/d/y):	Time(24h): standard/daylight	Tide Level
Segment ID:		hrs to hrs	to
Survey by: Foot / Boat / Helicopter/	Sun /Clouds /Fog /Rain /Snow /		Wind:

2. SURVEY TEAM		
OG		
ECO		
ARCH		

3. SHORELINE TYPE (overall substrate character and coastal character)

Bedrock Cliff / Platform	Boulder Beach	Sand Beach	Organic (type?)
Manmade Solid	Pebble Cobble Beach	Tidal Flat (sand / mud)	
Manmade Unconsolidated	Sand Gravel Beach	Salt Marsh	Other (type?)

Coastal Character (shore form):	Backshore Form

4. SEGMENT

Predominant Substrate: %Bedrock; % Unconsolidated; %Vegetated; %Manmade (permeableY/N); %Ice	
Slope: % Low; % Medium; % High; % Vertical	Wave Exposure: low / medium / high /
Total Segment Length (est. in m)	Access Restrictions:
Total Length Surveyed (est. in m)	

5. SURFACE COLLECTABLE OIL & DEBRIS

Total Pavement = sq.m area by cm deep	Oiled Logs = Oiled Vegetation =
Patties /Tarballs = bags	Oiled Trash = Other

6. SURFACE OILING CONDITIONS

L	AREA		Location in				Shore	SURFACE	% OIL	OIL					OIL							
O	Long	Wide	Shore Zone				Slope	SEDIMENT	COVER	THICKNESS					CHARACTER							
C	m	m	SU	UI	MI	LI	VHML	TYPE		PO	CV	CT	ST	FL	FR	MS	TB	TC	SR	AP	NO	DB
									%													

7. SUBSURFACE OILING CONDITIONS

PIT	PIT				PIT	OILED	CLEAN	SUBSURFACE						Water	Sheen	SEDIMENT TYPE
LOC.	SHOREZONE				DEPTH	ZONE	BELOW	OIL QUANTITY						Level	Colour	Profile from Surface
NO.	SU	UI	MI	LI	cm	cm - cm	(Y / N)	AP	OP	PP	OR	TR	NO	cm		to Lower Oiled Zone

8. COMMENTS

Photo Roll # _____Frames_____Video Tape #: _____ *Environment Canada: ver. 07/07/95*

FIG. 1 Example Shoreline Oiling Summary (SOS) Form (1)

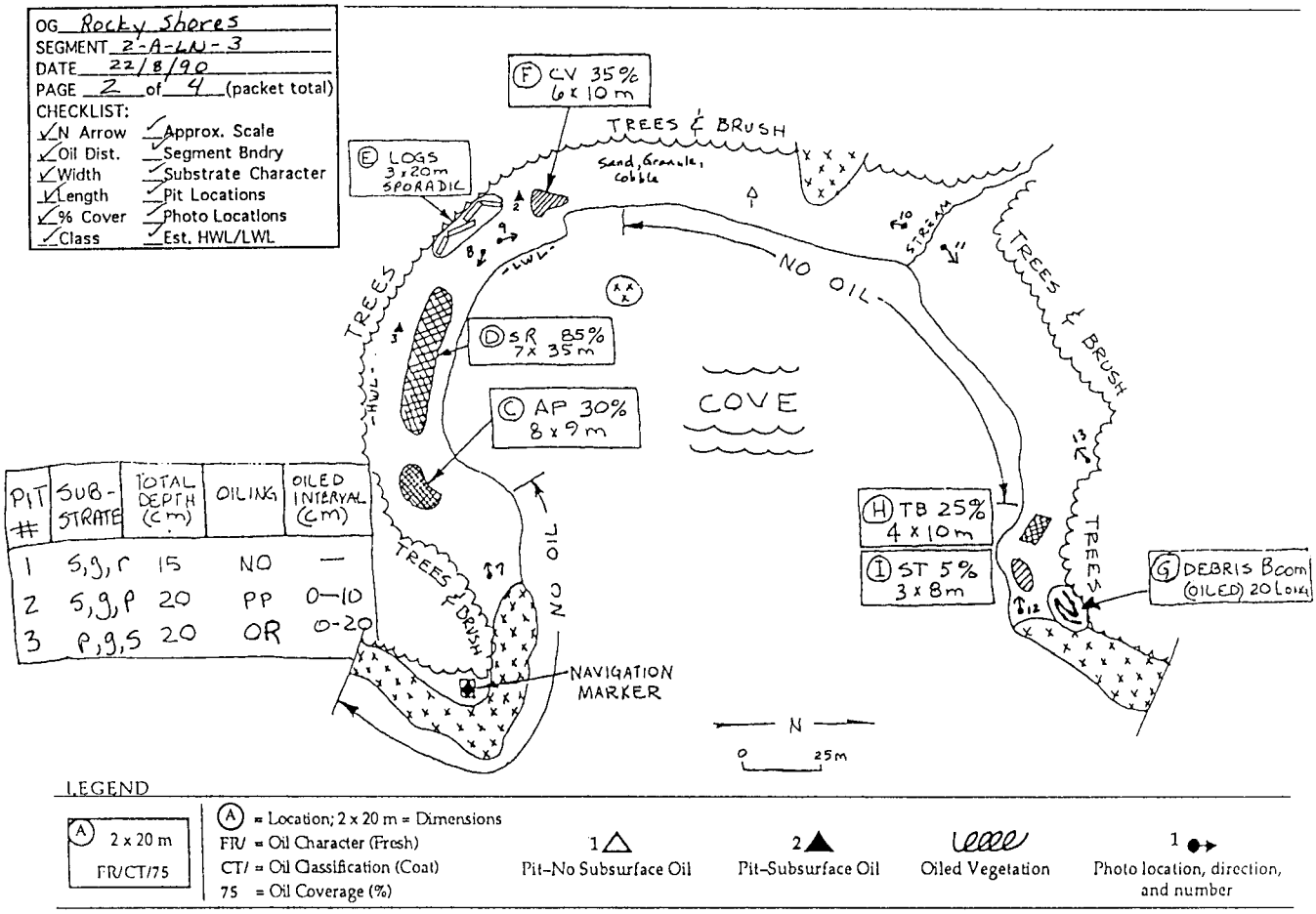

FIG. 2 Example of Completed Sketch Map[3]

REFERENCES

(**1**) Owens, E. H. and Sergy, G. A., Field Guide to the Documentation and Description of Oiled Shorelines, *Environment Canada, Edmonton*, ISBN 0-662-22048-X, 1994, 66 pages.

(**2**) Owens, E. H., and Reimer, P. D., Aerial Videotape Shoreline Surveys for Oil Spill Reconnaissance, Documentation, and Mapping, *Proceedings of the International Oil Spill Conference*, Publication No. 4529, American Petroleum Institute, Washington D.C., 1991, pp. 601-605.

(**3**) Owens, E. H., Sergy, G. A., and J. Michel, Applications of Standardized Assessment Techniques for Documenting Shoreline Oiling Conditions, *Proceedings 1995 International Oil Conference*, American Petroleum Institute, Washington, D.C., 1995, pp. 904-905.

(**4**) Environmental Canada, Oilspill SCAT Manual for the Coastlines of British Columbia, Prepared by Woodward-Clyde Consultants, *Seattle for the Environmental Technology Branch*, Environment Canada, Edmonton, 1992, 245 pages.

(**5**) Owens, E. H., and Teal, A. R., Shoreline Cleanup Following the "*Exxon Valdez* Oil Spill"-Field Data Collection Within the SCAT Program, Proceedings 13th Arctic and Marine Oilspill Program (AMOP) Technical Seminar, Environment Canada, Ottawa, 1990, pp. 411-421.